

CONTROL

Using the Community Pharmacy to Identify Patients at Risk of Poor Asthma Control and Factors which Contribute to this Poor Control

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Background. Although asthma can be well controlled by appropriate medication delivered in an appropriate way at an appropriate time, there is evidence that management is often suboptimal. This results in poor asthma control, poor quality of life, and significant morbidity. **Methods.** The objective of this study was to describe a population recruited in community pharmacy identified by trained community pharmacists as being at risk for poor asthma outcomes and to identify factors associated with poor asthma control. It used a cross-sectional design in 96 pharmacies in metropolitan and regional New South Wales, Victoria, Queensland, and Australian Capital Territory in Australia. Community pharmacists with specialized asthma training enrolled 570 patients aged ≥ 18 years with doctor-diagnosed asthma who were considered at risk of poor asthma outcomes and then conducted a comprehensive asthma assessment. In this assessment, asthma control was classified using a symptom and activity tool based on self-reported frequency of symptoms during the previous month and categorized as poor, fair, or good. Asthma history was discussed, and lung function and inhaler technique were also assessed by the pharmacist. Medication use/adherence was recorded from both pharmacy records and the Brief Medication Questionnaire (BMQ). **Results.** The symptom and activity tool identified that 437 (77%) recruited patients had poor asthma control. Of the 570 patients, 117 (21%) smoked, 108 (19%) had an action plan, 372 (69%) used combination of inhaled corticosteroid (ICS)/long-acting β_2 -agonist (LABA) medications, and only 17–28% (depending on device) used their inhaler device correctly. In terms of adherence, 90% had their ICS or ICS/LABA dispensed <6 times in the previous 6 months, which is inconsistent with regular use; this low adherence was confirmed from the BMQ scores. A logistic regression model showed that patients who smoked had incorrect inhaler technique or low adherence (assessed by either dispensing history or BMQ) and were more likely to have poor control. **Conclusion.** Community pharmacists were able to identify patients with asthma at risk of suboptimal control, and factors that contributed to this were elicited. This poorly controlled group that was identified may not be visible or accessible to other health-care professionals. There is an opportunity within pharmacies to target poorly controlled asthma and provide timely and tailored interventions.

Keywords asthma, Australia, community pharmacy, pharmacist, poor asthma control

INTRODUCTION

Asthma is one of the most common chronic diseases, affecting approximately 10% of the Australian population (1), 5.2% of the UK population (2), and 8.4% of the US population (3). Through good management, asthma can be well controlled and patients can obtain good health outcomes. However, asthma management is often sub-optimal, lagging behind the goals set by evidence-based guidelines (4, 5) leading to poor asthma control, poor

quality of life, and significant morbidity. There is evidence that people with asthma do not take their preventer medications regularly (6) due to factors such as patient beliefs about side effects (a concept rarely addressed in health care) (6), socioeconomic considerations, and poor health literacy (7, 8). Further, regardless of the regularity of use, there is evidence that people with asthma fail to achieve correct inhaler technique, health-care practitioners do not routinely check inhaler technique, and inhaler technique deteriorates over time (9, 10).

The International Primary Care Respiratory Group has recognized that improving the prevention and management of asthma is a high priority for primary health care in all countries (11). There is a paucity of data on people with asthma in primary care (12), and

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there are few studies (13, 14) addressing the current status of such patients, their asthma control, and how they are managed. There have been efforts to address this (13); however, the current status of patients and their asthma control, particularly those attending community pharmacy to access their medications, is rarely reviewed.

Community pharmacists are in an ideal position to assist in the identification of people at risk and provide assessment of people with asthma in the community. They have specialized therapeutic knowledge and, through a process of ongoing asthma review and goal setting, can provide additional patient support and improved health outcomes (15). Although community pharmacists are often included in asthma management initiatives (16), and some studies have used “data-mining” of dispensing records to alert health professionals to individual patients’ asthma medication use (17), the expertise of pharmacists in assessing people with asthma who are at risk of poor outcomes or providing specialized therapeutic interventions remains underutilized (18).

Our aim was to describe a large primary care asthma population, identified by trained community pharmacists as at risk of poor asthma outcomes, and to identify factors that may contribute to poor asthma control.

METHODS

Patients were recruited prospectively from community pharmacies using a cross-sectional design. The study protocol was approved by the Human Research Ethics Committees of The University of Sydney, Charles Sturt University, The University of Queensland, and Monash University. All pharmacists and patients provided written informed consent.

Pharmacist Recruitment

Pharmacists from both regional and metropolitan areas in four states/territories in Australia (New South Wales, Australian Capital Territory, Queensland, Victoria) were invited to participate. Pharmacists were included if they agreed to attend training in recruitment and asthma management and had the organizational capacity and facilities to perform asthma patient assessments (private counseling area, extra pharmacist to facilitate assessments).

Inclusion Criteria: Screening and Recruitment

Pharmacists recruited patients between January and May 2009. Patients were eligible to participate if they were aged ≥ 18 years and were considered to be at risk of poor asthma outcomes either by fulfilling ≥ 1 criterion from the revised Jones Morbidity Index (19) or by using reliever > 3 times/week, that is, consistent with suboptimal asthma control, or by not having had an asthma review in the previous 6 months (15). These data were collected based on patient self-report with a standardized tool (15) and reviewed by the pharmacist.

Exclusion Criteria

Patients were excluded if they had a terminal illness, if they did not speak English well enough to communicate with the pharmacist and complete the study questionnaires independently, if they were enrolled in another study, or if they did not self-administer their medicines/inhalers.

Asthma Assessment: Patient-Reported Data

Demographic data were collected, and patients were asked about their asthma history, smoking status, current medications, and ownership of a written action plan. All patient data were recorded in a file similar to that used in a previous randomized controlled trial (15). Asthma control was assessed using a symptom and activity tool from a previous pharmacy study (15), based on the Australian Asthma Management Handbook (20). This tool was based on self-reported frequency during the previous month of symptoms of asthma; waking at night because of asthma; chest tightness on waking; difficulty in performing vigorous activities; and difficulty in performing moderate activities. Asthma control was classified as “good” for patients who reported “never” for all parameters, “fair” for those who reported any parameter once a week or less, and “poor” for those who reported any parameter more than once per week (Appendix Table 1) (15, 20).

Asthma Assessment: Spirometry

Spirometry was performed in accordance with current guidelines (21) using the EasyOne™ spirometer (Niche Medical, Sydney, Australia). These spirometers grade quality for the spirometry session from A to F. Only sessions of quality A, B, or C were used for analysis, that is, two acceptable tests and between-test reproducibility for forced expiratory volume in 1 second (FEV₁) and forced vital capacity (FVC) of 200 mL or less (21). National Health and Nutrition Examination Survey (NHANES III) reference standard predicted values were used for the interpretation of spirometry.

Inhaler Technique Assessment

Patient technique for all inhaled medications was assessed using device-specific checklists that had been used previously in a randomized controlled trial of pharmacy asthma services (Appendix Table 2) (15). The proportion of patients with correct inhaler technique (all checklist steps performed correctly) was recorded. The most common devices used in the population, pressurized metered dose inhaler (pMDI), Accuhaler/Diskus® (GlaxoSmithKline, London, UK), Turbuhaler® (AstraZeneca, London, UK) and pMDI plus spacer, are reported.

Medication Data

Asthma medication profiles were generated from a combination of the dispensed medication history for the previous 6 months, supplied by the pharmacist doing the assessment, that is, only one pharmacy, and

medication use reported by the patient using the Brief Medication Questionnaire (BMQ) (22) (the BMQ asks patients to recall the medications (both anti-inflammatory and reliever) they have taken in the last week, whether they missed any doses and how many times they missed doses; it also asks patients about whether they had any difficulties in using their medications and whether they "bothered" them in any way). Thus if the patient reported in the BMQ that he/she was taking a particular asthma medication and it did not appear in his/her dispensed medication history for the previous 6 months, the number assigned was 0 dispensings. For medicines intended for regular use, the number of times dispensed in the previous 6 months compared with the number expected, which is 6, was used as a surrogate marker for adherence. In Australia, usually medicines are dispensed with a 30-day supply. Data on reliever use were only available for patients holding a government concession card (which reduces the patient co-payment for prescriptions), since short-acting β_2 -agonists (SABA) are available without prescription in Australia. In terms of patient-reported adherence, the BMQ (22) was used to collect data which were subdivided into a recall score, a health beliefs score and a regimen score. These values were added to give a total risk of nonadherence score. A higher value indicates a higher risk of nonadherence. Medications were divided into four main groups: combinations (inhaled corticosteroid (ICS)/long-acting β_2 -agonist (LABA)), preventers (ICS, other anti-inflammatory medications), symptom controllers (LABA), and relievers (SABA). ICS doses were defined as low (10–200 mcg/day fluticasone or equivalent), medium (250–500 mcg/day fluticasone or equivalent), or high (over 500mcg/day fluticasone or equivalent) (23).

Data Analyses

All data were collected by pharmacists and stored in secure patient files. Patient names were removed and coded and the data were collected and analyzed by the researchers. Data analysis was conducted using SPSS version 17TM (SPSS-IBM, Chicago, IL, USA). Descriptive analyses were performed on demographic data, asthma history, and asthma control. The Pearson's chi-square test was used to compare categorical variables. Univariate analysis was used to test for associations between asthma control as the dependent variable (dichotomized into good/fair and poor), age, gender, smoking status, ownership of an action plan, adherence score, FEV₁% predicted, dry powder inhaler (DPI) technique, and the number of times ICS/other anti-inflammatory medication or ICS/LABA was dispensed in the previous 6 months. Any dependent variable shown to be significantly associated with asthma control was then entered into a logistic regression and also tested for collinearity. To test the goodness of fit of the model the Hosmer and Lemeshow test was used. The level of significance was set at $p < .05$.

RESULTS

A total of 570 patients were recruited from 96 pharmacies. The mean age of the patients was 50.5 (SD 16.8). From the risk assessment and screening tool used to identify patients, 437 (77%) of patients were at risk for poor asthma outcomes because of suboptimal control (based on the revised Jones Morbidity Index or their reported reliever use (19)), whereas only 4% were at risk because of a lack of asthma review in the last 6 months; 26% satisfied both criteria. A summary of patient details, including their ownership of asthma action plans and medications, is included in Table 1.

When asthma control was assessed, using the specific symptom and activity instrument, it was classified as poor in 77% ($n = 437$) of patients, whereas 20% ($n = 115$) had fair and 3% ($n = 17$) had good asthma control (Figure 1). There was no difference in mean age ($p = .7$) or the mean length of time since asthma diagnosis ($p = .2$) between patients with poor and fair/good asthma control.

Medication Use and Use of Potentially Inappropriate Medications

The medication profile for patients is detailed in Table 1, 372 (65%) patients were on a combination product of ICS and LABA, Dosage information for ICS was obtained for 395 patients (65% fluticasone, 32% budesonide, 2.5% ciclesonide, <1% beclomethasone). A significantly larger proportion of patients taking fluticasone were on a high (23) dose (57%) than those taking budesonide (15%) ($p < .001$).

Nebulized medications are not recommended for use in adults with asthma in primary care in Australia; however, nebulized medications were dispensed for salbutamol

TABLE 1.—Patient details ($n = 570$).

Characteristic	<i>n</i> (%)
Male	216 (38)
Concession card ^a	257 (45)
Urban resident	402 (70)
Age of asthma onset	
Infancy	72 (13)
Before age 13	175 (31)
13 years or older	318 (56)
Allergic rhinitis, hayfever, or eczema	404 (71)
Current smoker	117 (21)
Smoking-related lung condition ^b	97 (17)
Action plan ownership	108 (19)
Medication ^c	
Combined ICS/LABA + reliever	372 (65)
Reliever only	109 (19)
ICS or other anti-inflammatory + reliever	55 (10)
Combined ICS/LABA only	24 (4)
ICS + LABA + reliever	10 (2)

Notes: ICS, inhaled corticosteroid; LABA, long-acting β_2 -agonist.

^aIn Australia, patients who hold a concession card, issued by Centrelink, are eligible for reduced patient co-payments for prescription medications.

^bChronic obstructive pulmonary disease, emphysema, airway limitation.

^cMedication classifications are reliever (salbutamol, terbutaline, ipratropium), ICS (beclomethasone, budesonide, fluticasone, ciclesonide), other anti-inflammatory medication (nedocromil, sodium cromoglycate, montelukast), and LABA (salmeterol, eformoterol).

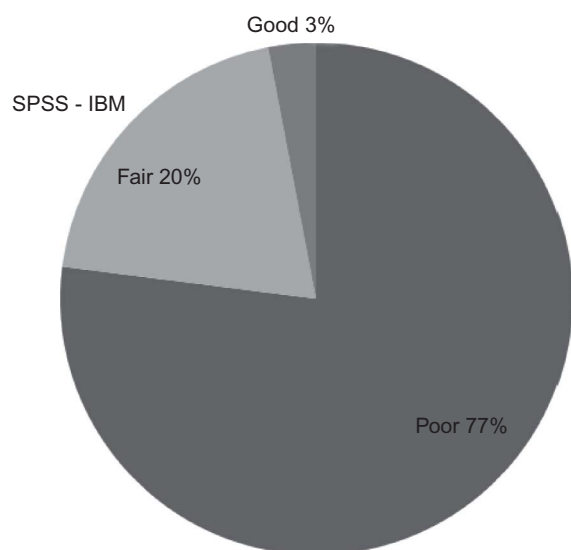


FIGURE 1.—Asthma control.

Note: Asthma control was assessed using a symptom and activity tool for all patients ($n = 570$) and the proportion with good, fair, or poor control was calculated.

($n = 42$), ipratropium ($n = 19$), and budesonide ($n = 2$). Tiotropium, which, in Australia, is only subsidized for patients with COPD, was dispensed for 77 (14%) patients, only 50 (65%) of whom reported a diagnosis of chronic obstructive pulmonary disease (COPD) or emphysema. β -blockers, which are recommended to be used with caution in asthma, were dispensed to 26 (5%) patients.

Medication Adherence

Of the population, 82% ($n = 465$) reported using and/or having been dispensed asthma medications intended for regular use (ICS, ICS/LABA, or other anti-inflammatory medications) in the previous 6 months. Of these, 90% had these medications dispensed <6 times, and almost two-thirds (63%) had ≤ 2 dispensings, that is, less than half the rate expected for regular use (Figure 2A). The mean value for risk of nonadherence score (total score) was 2.7 (SD 1.9) which is similar to values we have obtained previously (15). Since cost of medications may be an issue for some patients, the data were separated into those having a concession card and thus eligible for reduced patient co-payments for prescription medications and those not having the card. Adherence was somewhat higher for concession patients (84% <6 dispensings, 50% 1–2 dispensings) than for general patients (95% <6 dispensings, 74% 1–2 dispensings) (Figure 2B and 2C). Of concession patients ($n = 257$), the only ones for whom SABA supply can be tracked on a prescription record in Australia, 49% had ≥ 2 SABA prescriptions dispensed, consistent with daily use (Figure 2D).

Spirometry

All patients underwent spirometry; 431/570 spirometry sessions (76%) were of A, B, or C quality. Mean FEV₁ was $75 \pm 21\%$ predicted (range 23–127%) and in 55% patients FEV₁ was $<80\%$ predicted. Mean FVC was $82 \pm 16.5\%$ predicted (range 32–125%, 42% patients $<80\%$

predicted) and in 42% patients FVC was $<80\%$ predicted; 38.6% of patients had FEV₁/FVC < 0.7 .

Inhaler Technique

Almost all patients ($n = 548$, 96%) were assessed for inhaler technique. For pMDIs, 17% ($n = 70/424$) of those assessed demonstrated correct technique. For pMDI plus spacer, 28% ($n = 16/58$) were assessed as having correct technique. For DPIs, 23% ($n = 39/169$) who used a Turbuhaler® and 28% ($n = 34/121$) who used an Accuhaler/Diskus® had correct technique.

Regression Analysis

Each of the variables measured were initially tested in a simple regression to see if they were related to asthma control. Age, gender, whether the person was a concession card holder, spirometry (FEV₁% predicted), and ownership of an action plan were found not to be significant predictors and were not included in the final model. If patients smoked, had incorrect DPI technique, or had low adherence (in terms of both dispensed medications and risk of nonadherence score), they were more likely to have poor asthma control (Table 2). Adherence score and dispensed medication values were tested for collinearity and were found not to be significantly correlated. This model fitted the data well (Hosmer and Lemeshow test $\chi^2 = 8.676$, df = 8, $p = .37$).

DISCUSSION

This study aimed to describe a large primary care asthma population identified by trained community pharmacists as at risk of poor asthma outcomes and to identify factors that contribute to poor asthma control. A majority of the patients in this study reported taking medications that are recommended for moderate to severe asthma in clinical guidelines (20); however, 77% of them were determined as having poor asthma control. Poor adherence to medications, poor inhaler technique, and ongoing exposure to triggers such as smoking were predictors of poor asthma control. In this population, there was also an overreliance on relievers and a low incidence of ownership of written action plans; however, these were not significant predictors of poor control in our study.

Reasons for poor asthma control may be related to the patient themselves, their health-care providers, or both. A recent audit of asthma management by Australian General Practitioners indicated that only one-quarter routinely assessed asthma severity, one-eighth regularly reviewed action plans, and one-third regularly provided education about trigger factors (24). The 19% ownership of written action plans in our study population, consistent with levels reported in the Australian population (1), confirms this gap between clinical guidelines and actual practice. However, the majority of this patient cohort reported that they were on appropriate medications, but still they had poorly controlled asthma. This suggests that there

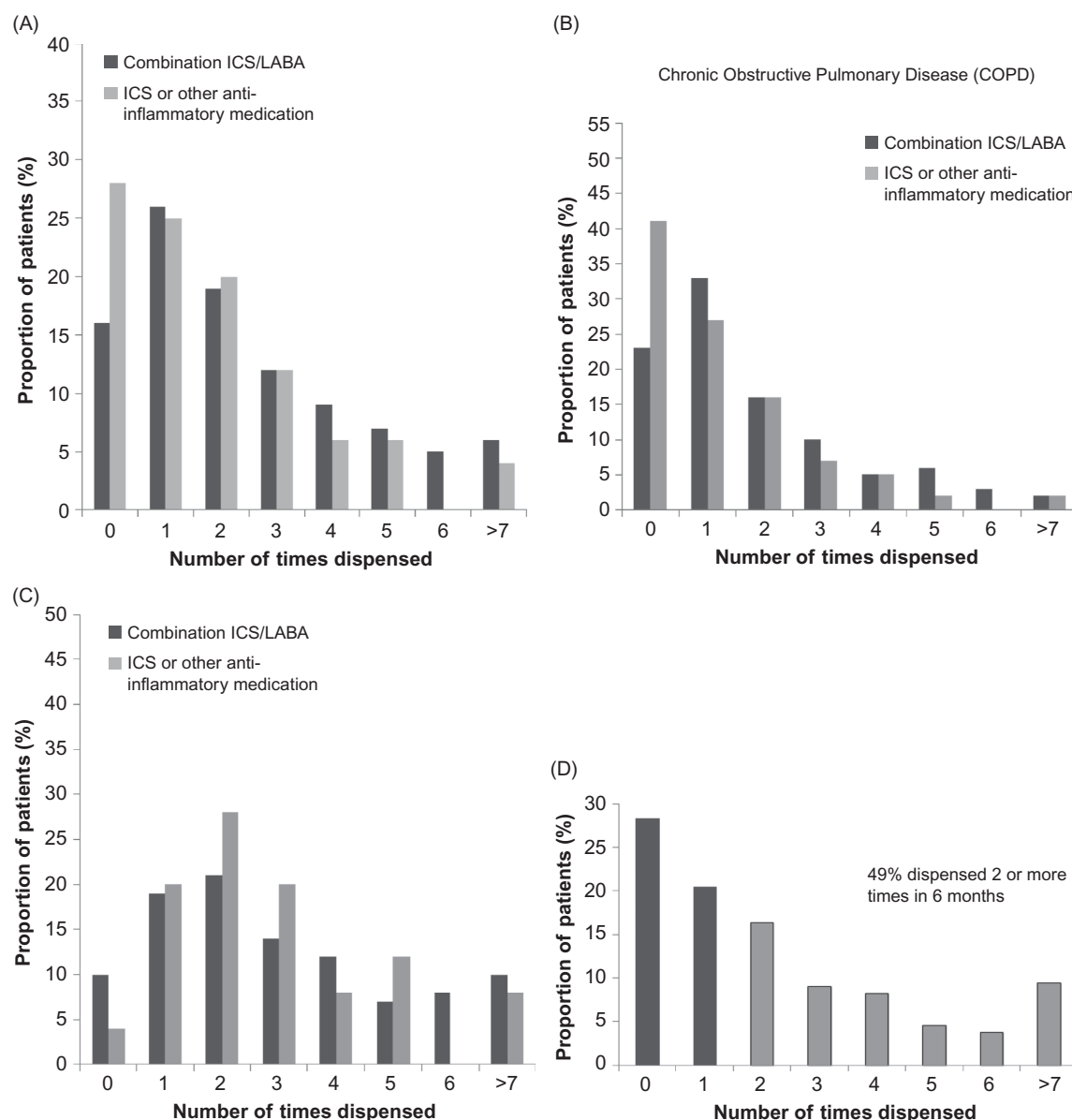


FIGURE 2.—Dispensing information (Previous 6 months): (A) overall population ($n = 465$); (B) general patients ($n = 245$); (C) concession patients ($n = 220$); (D) concession reliever dispensing ($n = 244$).

Notes: ICS, inhaled corticosteroid; LABA, long-acting β_2 -agonist. The number of times each asthma medication was dispensed in the previous 6 months was obtained from the dispensed medication history. Only the patients who had these medications on their dispensed medication history or reported taking them are included in these figures. For each figure a dispensing of 0 means that the patient reported using that medication but it was not on their dispensed medication history. Each dispensing provides 1 month of medication. Therefore, patients on a standard dose and adherent to their medication would be expected that they obtain their medication 6 times in a 6-month period. If relievers (salbutamol, terbutaline, ipratropium) were dispensed 2 or more times in 6 months, based on two puffs being the standard dose, this would indicate at least daily use of these medications.

may be issues with taking the medicines (adherence or technique).

Indeed when a logistic regression was performed, patient-centered reasons for suboptimal asthma control were related to three factors: poor adherence, inhaler technique, and ongoing exposure to triggers such as smoking. The first factor, poor adherence, is commonly reported in asthma (25–27). Many methods have been used to measure adherence (28); however, in terms of impact, in most cases, strategies to improve adherence have been part of a complex intervention, and a direct link between the intervention and adherence improvement has not been demonstrated. In this study, the fewer times an

anti-inflammatory asthma medication was dispensed, the more likely the patient was to have poor asthma control. Previous Australian studies have indicated that cost may affect adherence (29). While concession patients, that is, those in whom the patient co-payment for medications is reduced, were more likely to obtain ICS, they still had low adherence rates. This method of assessing adherence using the dispensed medication history from the patient's pharmacy is a direct measure of how many times the patient had the medication dispensed. These records did not include prescription medications dispensed by any other pharmacy in the previous 6 months, and the fact that some patients had 0 dispensings of an inhaler

TABLE 2.—Predictors of poor asthma control: logistic regression model.

Variable	Odds ratio	95% CI
Smoker	3.89	1.17 – 13.5
DPI ^a technique incorrect	1.65	1.14 – 4.18
Higher score on BMQ (higher risk of nonadherence)	1.2	1.03 – 1.43
Decreased dispensed ICS/anti-inflammatory or medication or ICS/LABA in the 6-month period before recruitment	1.18	1.04 – 1.34

Notes: DPI, dry powder inhaler; BMQ, Brief Medication Questionnaire; ICS, inhaled corticosteroid; LABA, long-acting β_2 -agonist.

^aDPIs (TurbuhalerTM and AccuhalerTM/Diskus) were chosen for this analysis because they are primarily used for ICS or ICS/LABA medications and poor technique with these devices could be associated with poor asthma control.

could be explained by use of an alternate pharmacy; however, 85% of people return to their regular pharmacy (30) for their medications. This method has been used with success in the past and has been reviewed by Andrade et al. (31). There is always the possibility that patients were obtaining medications from an alternate pharmacy; however, given that recruited patients were regular customers of the recruiting pharmacy, this is unlikely.

However, in order to obtain a further record of adherence we used a validated instrument which uses patient recall to test for adherence, the BMQ (22). The mean value obtained for this population was similar to that we have reported previously in asthma patients (15) and is slightly lower than values we obtained using the same instrument in diabetes patients (32). The scores from the BMQ were not correlated with the number of dispensings of ICS and so were able to be used independently in the logistic regression. The two methods are using different ways of measuring adherence. The dispensed medication history is a cumulative value obtained over the previous 6 months whereas the BMQ asks patients to recall the medications (both anti-inflammatory and reliever) they have taken in the last week.

The second factor related to suboptimal control was inhaler technique. Only 23–28% of patients (depending on device) were able to demonstrate correct use of their DPI, and if technique was incorrect, the patient was 2.4 times more likely to have poor control. Only technique for DPIs was used in the regression analysis, as these devices are primarily used for asthma anti-inflammatory medications. This reflects results from other studies (9, 10) and the fact that asthma control can be improved with improved technique. Indeed we have shown that improvement in inhaler technique alone can significantly reduce peak flow variability and improve other asthma outcomes (9). Thus although patients in this study were on appropriate medications, they were not using them correctly and not likely to be receiving the required dose to control their asthma. There is a need to constantly reinforce inhaler technique which can be achieved quite easily in pharmacy practice (33).

The last factor related to suboptimal asthma control was ongoing exposure to triggers, such as smoking. In this

study, 21% of patients were smokers, and patients were 3.3 times more likely to have poor control if they smoked. This finding is consistent with a recent review (34), and specialized smoking interventions may be particularly relevant in community pharmacy settings.

This study also highlighted the use of high dose ICS, as well as overreliance on relievers and nebulized therapies, which are not recommended in asthma management. Fluticasone was prescribed in high doses (23) for a significantly larger proportion of patients than for budesonide. This may be related to the available dose forms and the use of lower strengths of budesonide/eformoterol for maintenance and reliever therapy. It may also be reflective of prescribing habits. There has been considerable debate about the use of high dose ICS, and evidence that these high doses are overused (1, 35); our results confirm this. Patients with poorly controlled asthma may be prescribed unnecessarily high ICS doses, when the issue may instead be related to taking the medication and taking it appropriately, this issue awaits further study. In Australia, there are limited data about reliever use as many patients purchase them without a prescription. In our study, 49% of concession card holders had two or more SABA prescriptions dispensed in the previous 6 months, consistent with daily use and indicating an overreliance on these medications. Further, based on Australian guidelines (20, 23), there was ongoing use of potentially inappropriate medications and dosage forms, particularly nebulized medications.

A strength of this study was that the patient assessments were performed by trained pharmacists, which included training in spirometry measurement by respiratory scientists. Most (76%) spirometry readings were of acceptable standard, with reproducibility within 200 mL (A, B, or C quality), confirming the community pharmacist's capacity to provide lung function assessment as a monitoring tool for asthma (36). The mean FEV₁% predicted was 75%, with 55% of patients having values below 80% predicted, consistent with most patients having suboptimal asthma control. However, lung function was not used to assess asthma control, rather it was used as a visual tool to get the patients to focus on their lung health. If lung function values were abnormal they were referred to their physician for further assessment. Some patients had FEV₁ values at or above predicted values, and this could reflect both the variable nature of asthma and our protocol that, unlike in many clinical trials, patients were not asked to withhold bronchodilator medications before performing spirometry. Indeed, spirometry in a general medical practitioner's office is often performed as an unplanned test, when these medications would not be withheld.

This is one of the few studies highlighting the role that pharmacists, as primary care providers, could play in identifying and perhaps referring for poorly managed asthma. As with previous research, this study indicates that a simple risk assessment tool can be effective in identifying at-risk asthma patients in primary care populations (37). This study also shows that this

tool, combined with a comprehensive asthma/medication assessment, provides an opportunity for appropriately trained community pharmacists to identify and facilitate possible improvement in asthma management. This could occur through referral to medical practitioners and/or reinforcement of asthma care interventions by pharmacists at key time points (e.g., when patients purchase asthma medications). These findings are consistent with other research demonstrating that pharmacists can facilitate asthma referrals to medical practitioners (17). An efficient way to enhance collaborative interventions between physicians and pharmacists, in pharmacist-referred patients, would be a comprehensive assessment summary targeting individuals' reasons for poor asthma control.

Limitations

The population recruited for this study represents an at-risk patient population who may have worse asthma control than the general asthma population. The population excluded those aged under 18 years and those with other serious illnesses, and included those who were purchasing asthma medications. Medication profiles were calculated partly using data from dispensed medication histories. Patients may have had medications dispensed but not taken them. Patients were recruited based on self-reported doctor-diagnosed asthma, but confirmation of diagnosis was not sought from the patients' doctors. Finally, some patients may have had COPD as well as asthma, and so these results, while generalizable to community pharmacy patients, may not reflect an "asthma-only" population.

CONCLUSIONS

We have described a large population of people with asthma in primary care at risk of suboptimal asthma control and identified factors that may relate to poor asthma control. This study particularly highlights inappropriate use of asthma medications in the community, indicating the need for additional strategies and resources to assist with asthma management. This study demonstrates that trained community pharmacists, as skilled health professionals, can effectively identify and potentially refer such high-risk patients.

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DECLARATION OF INTEREST

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APPENDIX. TOOLS

1. ASTHMA CONTROL TOOL

Ask your patient if he/she has experienced any of the following in the last month (tick):

	Never	Once a week or less	More than once a week	Not sure
Symptoms of asthma, cough, wheeze, shortness of breath				
Waking at night because of asthma				
Chest tightness on waking				
Difficulty in performing vigorous activity like running, lifting heavy objects, exercise				
Difficulty in performing moderate activities like vacuuming, climbing flights of stairs				
Asthma Control	Good	Fair	Poor	Not sure

In training pharmacists were told that the furthest tick to the right defined control. This instrument is sensitive to change in asthma control based on management (15).

2. DEVICE CHECKLIST

Please tick actions completed and add ticks to calculate score when completed.

1. ACCUHALER

- ☐ Puts thumb into thumb grip groove
- ☐ Pushes in anticlockwise direction until click is heard
OR pushes lever until it clicks
- ☐ Exhales
- ☐ Exhales away from device
- ☐ Places lip over mouthpiece & inhales deeply
- ☐ Holds breath for 10 seconds
- ☐ Breathes out
- ☐ Breathes out away from the Accuhaler
- ☐ Waits before repeating procedure
- ☐ Pulls the groove back into place

SCORE /10

3. TURBUHALER

- ☐ Removes Cover
- ☐ Holds Inhaler upright at 90 degrees
- ☐ Turns bottom until click is heard
- ☐ Clicks only once
- ☐ Exhales
- ☐ Exhales away from device
- ☐ Puts mouthpiece in mouth
- ☐ Breathes in forcefully
- ☐ Removes mouthpiece before exhaling
- ☐ Holds breath
- ☐ Exhales away from mouthpiece
- ☐ Waits 20-30 seconds before clicking for next dose

SCORE /12

5. AUTOHALERS

- ☐ Removes Cover
- ☐ Holds Autohaler upright
- ☐ Pushes lever up
- ☐ Shakes the Autohaler
- ☐ Breathes out before inserting mouthpiece
- ☐ Inserts mouthpiece
- ☐ Closes lips around mouthpiece
- ☐ Hands do not block air vents while mouthpiece in
- ☐ Device held upright while insertion into mouth
- ☐ Breathes in
- ☐ Does not stop breathing as dose is released
- ☐ Takes Autohaler out of mouth & holds breath
- ☐ Holds breath for 5-10 seconds
- ☐ Pushes lever down gently
- ☐ Replaces cover

SCORE /15

2. METERED DOSE INHALER + SPACER

- ☐ Removes Cap
- ☐ Shakes Inhaler
- ☐ Puts mouthpiece of Inhaler in correct end of spacer
- ☐ Breathes out
- ☐ Places spacer mouthpiece between lips
- ☐ Presses Inhaler once to actuate
- ☐ Breathes in
- ☐ Holds breath for 10 seconds
- ☐ Breathes out & then in
- ☐ Holds for further 5 sec OR breathes in & out 3-4 times

SCORE /10

4. METERED DOSE INHALER

- ☐ Removes Cap
- ☐ Shakes Inhaler
- ☐ Tilts head back OR keeps at level
- ☐ Exhales (to functional residual capacity)
- ☐ Inserts mouthpiece & closes lips firmly around rim
OR holds mouthpiece 2-4 cm from mouth
- ☐ Actuates Inhaler once
- ☐ Begins to inhale as soon as actuation is done
- ☐ Continues slow deep inspiration
- ☐ Holds breath for 5-10 seconds
- ☐ Exhales
- ☐ Shakes canister
- ☐ Waits 20-30 seconds before next actuation

Replaces cap SCORE /13

6. AEROLISER

- ☐ Lifts off cap
- ☐ Holds the base, turns mouthpiece in direction of arrow
- ☐ Removes capsule from blister pack & places inside
- ☐ Holds device upright, squeezes side buttons once
- ☐ Breathes out
- ☐ Breathes out away from device
- ☐ Places mouthpiece in mouth
- ☐ Seals lips around mouthpiece
- ☐ Takes a long deep breath in
- ☐ Holds breath for 10 seconds
- ☐ Breathes out slowly
- ☐ Shakes device to see if medication left
- ☐ Breathes in, holds & exhales as before
- ☐ Throws empty capsule
- ☐ Replaces cap

SCORE /15

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